

CLAIMS

What is claimed is:

1. A multiple speed power transmission, comprising:
 - 5 first and second input shafts;
 - an output shaft;
 - a layshaft;
 - a first set of selectable torque paths between the first input shaft and layshaft;
 - a second set of selectable torque paths between the second input shaft and
 - 10 layshaft;
 - a third set of selectable torque paths between the layshaft and the output shaft;
 - and
 - a selectable bridge torque path between the first input shaft and the output shaft.
- 15 2. The transmission of claim 1, further comprising:
 - an input;
 - a first clutch driveably connected to the input and first input shaft for alternately connecting and disconnecting the input and the first input shaft; and
 - 20 a second clutch driveably connected to the input and second input shaft for alternately connecting and disconnecting the input and the second input shaft.
3. The transmission of claim 1, wherein the first set of torque paths comprises:
 - 25 first and second pinions secured to the first input shaft;
 - first and second gears journaled on the layshaft and in continuous meshing engagement with the first and second pinions, respectively; and
 - a first coupler secured to the layshaft for releasably coupling the first gear and second gear alternately to the layshaft.

4. The transmission of claim 1, wherein the first set of torque paths comprises:

- a first pinion secured to the first input shaft;
- 5 a first gear journalled on the layshaft and in continuous meshing engagement with the first pinion; and
- a first coupler secured to the layshaft for releasably coupling the first gear to the layshaft.

10 5. The transmission of claim 1, wherein the second set of torque paths comprises:

- third and fourth pinions secured to the second input shaft;
- third and fourth gears journalled on the layshaft and in continuous meshing engagement with the third and fourth pinions, respectively; and
- 15 a second coupler secured to the layshaft for releasably coupling the third gear and fourth gear alternately to the layshaft.

6. The transmission of claim 1, wherein the third set of torque paths comprises:

- 20 a low range selectable torque path; and
- a high range selectable torque path.

7. The transmission of claim 6, wherein the third set of torque paths further comprises:

- 25 a reverse range selectable torque path that causes the output shaft to rotate in an opposite direction from a direction of rotation of the output shaft produced by the low range torque path and the high range torque path.

8. The transmission of claim 1, wherein the third set of torque paths comprises:

- fifth and sixth pinions journaled on the layshaft;
- fifth and sixth gears secured to the output shaft and in continuous meshing engagement with the fifth and sixth pinions, respectively; and
- a third coupler secured to the layshaft for releasably coupling the fifth pinion and sixth pinion alternately to the layshaft.

9. The transmission of claim 8, wherein the third set of torque paths further comprises:

- an idler shaft;
- a seventh pinion secured to the layshaft;
- a seventh gear journaled on the idler shaft and driveably connected to the seventh pinion;
- an eighth pinion secured to the idler shaft in continuous meshing engagement with the fifth gear; and
- a fourth coupler secured to the idler shaft for releasably coupling the seventh gear to the idler shaft.

10. The transmission of claim 1, wherein the third set of torque paths comprises:

- an auxiliary shaft;
- a sun gear secured to the auxiliary shaft;
- a planet carrier driveably connected to the output shaft;
- a ring gear secured against rotation;
- a set of planet gears supported on the planet carrier and in continuous meshing engagement with the sun gear and ring gear;
- ninth and tenth pinions journaled on the layshaft;

a ninth gear secured to the auxiliary shaft and in continuous meshing engagement with the ninth pinion;

a tenth gear driveably connected to the output shaft and in continuous meshing engagement with the tenth pinion; and

5 a third coupler secured to the layshaft for releasably coupling the ninth pinion and tenth pinion alternately to the layshaft.

11. The transmission of claim 10, wherein the third set of torque paths further comprises:

10 an idler shaft;

a seventh pinion secured to the layshaft;

a seventh gear journaled on the idler shaft and driveably connected to the seventh pinion;

an eleventh pinion secured to the idler shaft;

15 an eleventh gear secured to the auxiliary shaft and in continuous meshing engagement with the eleventh pinion; and

a fourth coupler secured to the idler shaft for releasably coupling the seventh gear to the idler shaft.

20 12. The transmission of claim 8, wherein the bridge torque path comprises:

an idler shaft;

a second pinion secured to the first input shaft;

a second gear journaled on the idler shaft and in continuous meshing engagement with the second pinion;

25 an eighth pinion secured to the idler shaft;

a fifth gear secured to the output shaft and in continuous meshing engagement with the eighth pinion; and

a fourth coupler secured to the idler shaft for releasably coupling the second gear to the idler shaft.

13. The transmission of claim 10 wherein the bridge torque path comprises:
a first pinion secured to the first input shaft;
an idler shaft;
5 an eleventh pinion secured to the idler shaft;
an eleventh gear secured to the auxiliary shaft and in continuous meshing
engagement with the eleventh pinion;
a thirteenth gear journaled on the idler shaft and in continuous meshing
engagement with the first pinion; and
10 a fourth coupler secured to the idler shaft for releasably coupling the thirteenth
gear to the idler shaft.

14. A multiple speed power transmission, comprising:
an input;
15 first and second input shafts;
a first clutch driveably connected to the input and first input shaft for
alternately connecting and disconnecting the input and the first input shaft;
a second clutch driveably connected to the input and second input shaft for
alternately connecting and disconnecting the input and the second input shaft;
20 an output shaft;
a layshaft;
a first set of selectable torque paths between the first input shaft and layshaft;
a second set of selectable torque paths between the second input shaft and
layshaft;
25 a third set of selectable torque paths between the layshaft and the output shaft;
and
a selectable bridge torque path between the first input shaft and the output
shaft.

15. The transmission of claim 14, wherein the first set of torque paths comprises:

first and second pinions secured to the first input shaft;

first and second gears journaled on the layshaft and in continuous meshing engagement with the first and second pinions, respectively; and

a first coupler secured to the layshaft for releasably coupling the first gear and second gear alternately to the layshaft.

16. The transmission of claim 14, wherein the first set of torque paths comprises:

a first pinion secured to the first input shaft;

a first gear journaled on the layshaft and in continuous meshing engagement with the first pinion; and

a first coupler secured to the layshaft for releasably coupling the first gear to the layshaft.

17. The transmission of claim 14, wherein the second set of torque paths comprises:

third and fourth pinions secured to the second input shaft;

third and fourth gears journaled on the layshaft and in continuous meshing engagement with the third and fourth pinions, respectively; and

a second coupler secured to the layshaft for releasably coupling the third gear and fourth gear alternately to the layshaft.

18. The transmission of claim 14, wherein the third set of torque paths comprises:

a low range selectable torque path; and

a high range selectable torque path.

19. The transmission of claim 18, wherein the third set of torque paths further comprises:

a reverse range selectable torque path that causes the output shaft to rotate in an opposite direction from a direction of rotation of the output shaft produced by the low
5 range torque path and the high range torque path.

20. The transmission of claim 14, wherein the third set of torque paths comprises:

fifth and sixth pinions journaled on the layshaft;
10 fifth and sixth gears secured to the output shaft and in continuous meshing engagement with the fifth and sixth pinions, respectively; and
a third coupler secured to the layshaft for releasably coupling the fifth pinion and sixth pinion alternately to the layshaft.

15 21. The transmission of claim 20, wherein the third set of torque paths further comprises:

an idler shaft;
a seventh pinion secured to the layshaft;
a seventh gear journaled on the idler shaft and driveably connected to the
20 seventh pinion;
an eighth pinion secured to the idler shaft in continuous meshing engagement with the fifth gear; and
a fourth coupler secured to the idler shaft for releasably coupling the seventh gear to the idler shaft.

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22. The transmission of claim 14, wherein the third set of torque paths comprises:

an auxiliary shaft;
a sun gear secured to the auxiliary shaft;

a planet carrier driveably connected to the output shaft and auxiliary shaft;
a ring gear secured against rotation;
a set of planet gears supported on the planet carrier and in continuous meshing engagement with the sun gear and ring gear;
5 ninth and tenth pinions journaled on the layshaft;
a ninth gear secured to the auxiliary shaft and in continuous meshing engagement with the ninth pinion;
a tenth gear driveably connected to the output shaft and in continuous meshing engagement with the tenth pinion; and
10 a third coupler secured to the layshaft for releasably coupling the ninth pinion and tenth pinion alternately to the layshaft.

23. The transmission of claim 22, wherein the third set of torque paths further comprises:

15 an idler shaft;
a seventh pinion secured to the layshaft;
a seventh gear journaled on the idler shaft and driveably connected to the seventh pinion;
an eleventh pinion secured to the idler shaft;
20 an eleventh gear secured to the auxiliary shaft and in continuous meshing engagement with the eleventh pinion; and
a fourth coupler secured to the idler shaft for releasably coupling the seventh gear to the idler shaft.

25 24. The transmission of claim 21, wherein the bridge torque path comprises:
an idler shaft;
a second pinion secured to the first input shaft;
a second gear journaled on the idler shaft and in continuous meshing engagement with the second pinion;

an eighth pinion secured to the idler shaft;
a fifth gear secured to the output shaft and in continuous meshing engagement
with the eighth pinion; and
a fourth coupler secured to the idler shaft for releasably coupling the second
5 gear to the idler shaft.

25. The transmission of claim 22, wherein the bridge torque path comprises:
a first pinion secured to the first input shaft;
an idler shaft;
10 an eleventh pinion secured to the idler shaft;
an eleventh gear secured to the auxiliary shaft and in continuous meshing
engagement with the eleventh pinion;
a thirteenth gear journaled on the idler shaft and in continuous meshing
engagement with the first pinion; and
15 a fourth coupler secured to the idler shaft for releasably coupling the thirteenth
gear to the idler shaft.